travellers described to me as a broken line of rocky and barren acicular mountains, tall, gravelly, waterless, and lying about five days' journey beyond the wooded hills. Early in the morning of Thursday, 17th April, the *Eliza* was lying off Mr. Walker's factory, and I was welcomed with the usual hospitality by Mr. Hogg, then in charge. I will conclude this brief record of first impressions amongst the Fans with tendering my best thanks to that gentleman for his many little friendly offices, without which travelling in these regions is rather a toil than a pleasure.

R. F. BURTON.

V.—*The Brain and the Skull in some of the Families of Man.*

By L. J. BEALE, M.R.C.S., F.R.S.L.

(*Read March 3rd*, 1863).

IN calling the attention of the Society to this subject, I am afraid I must go over ground that is familiar to all; but I have heard repeated in this room opinions so opposed to the utility of studying the various form of the skull, as a test of race and as a means of classifying the families of man, that I propose examining the subject solely with a view of determining whether anything can be learned from the size and shape of the brain and skull that may help us in the more important knowledge of the mind and character of a race, and enable us to form an opinion whether the families which have always inhabited the large divisions of the globe so differ in their sensibilities, their conceptions, and their intellectual powers, as to warrant the belief that their skulls are not only different now, but have ever been so from their creation.

It is unnecessary to say much about the relative size of the brain and skull: I believe all physiologists will allow that there is sufficient parallelism between the surface of the brain and the surface of the skull to say that the shape of the one may practically be taken as the shape of the other. That the skull is moulded on the brain; that in childhood, as the brain grows, the deposit of new bone is formed to suit the growth of brain. Moreover, when, in addition to growth of brain, we have a diseased condition, and an excess of fluid in the cavities of the brain, the skull accommodates itself to the morbid deposit, and becomes preternaturally large. So cases are recorded where the skull has increased in size at its anterior part in a few years, while the individual has been entirely devoted to some special studies. That the brain case is a perfect mould of the brain we are not warranted in asserting, and we must admit that the brain itself may

be modified in shape by outward pressure applied to the skull. With certain exceptions, therefore, we may assert that the outward form of the skull does vary in shape as the brain varies, and experience proves that the skulls of several unmixed primitive races may be distinguished by the shape of their skulls; therefore, the study of the skull must be of some use in ethnological inquiries. But if we are to learn nothing more from the shape of the skull than to determine whether it belonged to a Negro or an Australian, the study is little better than a waste of time. If it can be shown that the skull indicates the form of the brain sufficiently to give us a good idea of the general form of the brain, and if the form of the brain does indicate the possession of instincts, intellectual faculties, and moral powers, then the study of the skull becomes of real value. That the phrenologists have proceeded too rapidly in mapping out the surface of the brain into many distinct faculties before sufficient evidence of their reality had been obtained, may be admitted, but that the brain is the organ of the mind, and that the mind consists of various faculties, powers, affections, feelings, etc., is now admitted by all inquirers.

Unless the measurements of the skull can lead to some practical results it will be useless to record them; unless they indicate something from which we can draw conclusions useful to science, the inquiry will only be lost time. Now we all agree that the size and shape of the skull reveals to a sufficient extent the size and shape of the brain. What does the size and shape of the brain reveal? If we can show that these do reveal some knowledge of the functions of the brain, then will our records of the measurements of the skull lead us to something worth knowing. Now phrenologists have long asserted that every square inch of skull gives us knowledge of the amount of brain below, and that amount of brain below tells us what faculties of mind are predominant. We must all wish that phrenology was true, for there could not be an easier mode of getting at a knowledge of mind; but both practical physiologists and impracticable metaphysicians contradict it at all points, and prove that some at least of the observations of the phrenologists cannot be verified. Still, there are many physiologists, and one or two metaphysicians who admit that there is some truth in phrenology; and I think we may assume, as a general fact, that many observers who would repudiate the name of phrenologist, will agree that the anterior lobes of the brain are the organs upon the action of which the knowing, comparing, and reasoning powers of the mind depend; that in this part of the brain are seated the intellectual faculties; that the middle and posterior lobes of the brain give us the intuitive feelings, sentiments, and affections; and that at the base

of the brain with the cerebellum are developed those animal appetites, propensities, and powers which ally us to the brute creation. I believe there is truth in these general conclusions. I believe, moreover, that many of the particular conclusions of the phrenologists are founded on correct observations; but if we can agree that there really exists in the anterior, middle, and base of the brain special classes of functions, we shall have scope enough to make our measurements of the skull useful.

If we are warranted in believing that the brain is the organ of the mind, and that the skull does to a great extent reveal to us the size and shape of the brain, it is difficult not to hope and to believe that a study of the skull in the various families of man, will give us some information as to the functions of the various parts of the organ on which the skull is moulded. When we look at such skulls as those on the table, and observe the differences in breadth, height, length, and general form, we cannot refrain from thinking that the faculties of the contained organ must have been very different, and I do think we have sufficient evidence that such is the fact. It is, I believe, true, that you will find in every race heads of almost every variety of shape; and, if there be any truth in phrenology, such we should expect would be the case, because we know that in any large number of people are to be found endless varieties of character: and if, as we believe, these varieties of character depend on the larger or smaller capacity of different portions of brain, we should, *à priori*, anticipate a large variation in the size and shape of the skull in every people.

Admitting, however, the fact, that in every country you will find heads of every shape, so that it would not be difficult among our own population, for example, to find heads in form very similar to the Negro, the Mongol, or the American type, yet these *are exceptions*, while among those respective families of man it *is the rule*, that the form of the skull, and also of the brain, shall be of the general size and shape known as appertaining to particular races. If we were to examine a thousand European skulls, we should find a considerable number so formed that they might be mistaken for the skulls of some uncivilised race. If we were to take one thousand Australian, Negro, or native American skulls, we might find some that would resemble those of Europeans, but the vast majority would exhibit the distinguishing features which enable us to classify them as examples of a type. There are some families with such peculiar skulls, that even a slight examination will enable any one to say at once this is a Negro, that is a Mongolian, and that is an Australian skull. The skulls which appear to me to be most marked, and to point to different races, are the Indo-European, the Mongolian, the Negro, the native American, the ancient Peruvian, the Australian.

The Indo-European contrasts strongly with the others by the breadth and height of the anterior part, the breadth as well as height of the vertex. This part of the skull is also high in the Mongolian races, but it is not broad or rounded, and gives that lozenge or triangular form which distinguishes the Mongolian peoples. If we place the internal senses which lead to moral and intellectual powers in the anterior two-thirds of the brain, we account for the development of those mental superiorities, which have for thousands of years distinguished the people of the south-west of Asia and the whole of Europe.

The Mongolian skull is distinguished by breadth from ear to ear, narrowing anteriorly and upwards to the vertex, constituting from the breadth of the cheek bones a very distinguishing form, more apparent in the Esquimaux and Tartar families, but still very remarkable in the refined and educated Chinese. The Chinese have a civilisation which dates back to at least a thousand years before the Christian era; they have cultivated several arts from time immemorial; we have borrowed from them the manufactures of porcelain, silk, etc.; what we have taken from them as arts we have made into sciences, by a mental process of which it appears questionable whether a Chinese is capable. Their written language is a mere imitation by signs of ideas and facts; while the written languages of the European races are abstractions from sounds and accents. Is the Mongolian mind incapable of abstract and general ideas? White, as a colour, the Chinese understand as well as we do, but can they form an idea of whiteness abstracted from its object. Without the powers of generalisation and abstraction, we could have done little in poetry or philosophy. Certain it is that China has never produced a Homer, a Plato, a Shakspeare, or a Newton.

The Negro skull is distinguishable by its long and narrow form, its low and narrow forehead, and its great weight and solidity: this last feature it has in common with the Australian, American, and probably all uncivilised people; the skulls of the Chinese are often as thin and delicate as those of Europeans. The internal capacity of the Negro skull is much less than that of any other race. Dr. Morton gives the following table, showing the mean internal capacity of the skulls of the following races:—

	No. of Skulls.	Mean Internal Capacity in Cubic Ins.	Largest in Series.	Smallest.
Caucasian	62	87	109	75
Mongolian	10	88	93	69
Malay	18	81	89	64
American	147	80	100	60
Ethiopian	29	78	94	65

The Caucasian, or, as we should now say, the Indo-European

skulls, were derived from the lowest and least educated classes. Three were Hindoos, which nation, according to Morton, have the smallest of all skulls, seventeen giving only a mean of seventy-five cubic inches. The Mongolians measured consist of Chinese and Esquimaux; three of the latter give a mean of eighty-six cubic inches, while seven Chinese gave but eighty-two. The Ethiopians were all Negroes, nine being native Africans. Of the American races, Dr. Morton mentions the striking fact that the Peruvians have the smallest heads of all American nations, the Mexicans being somewhat larger, and those of the barbarous tribes the largest of all. The general capacity of different skulls tells us something, but the relative proportion of brain in the anterior and posterior chambers of the skull would tell more. Dr. Morton says he had neither leisure nor adequate materials for the inquiry. The latter difficulty still exists.

The American skull is distinguished by flatness of the occiput, it is round, most generally short from the frontal bone to the occipital, and almost equal in diameter from the two parietal bones as from front to back, contrasting strongly with the very long and narrow Negro skull. Some of the old Peruvian skulls bear unmistakeable proof of artificial compression of the frontal bone, bringing nearer together the front and back, and expanding the two sides. It is singular that what in Europe would be considered a deformity, was, in the time of the Incas of Peru, looked upon as the most desirable form of head. Many of the representations which remain of the Incas give them the appearance of idiots. A very small head appears to have been thought by these people the perfection of form. The remarkable flatness of many American skulls at the occiput is clearly artificial in some very marked instances, but it occurs so commonly that this feature has been considered by many as characteristic of the native American races. There is a skull of an infant in the Museum of the College of Surgeons so flattened by artificial pressure, that its life was in all probability sacrificed to the barbarous process.

The ancient Peruvian skull differs so much from the American Indians, that Dr. Morton is inclined to consider they indicate a different race, who peopled Peru before the time of the Incas. In the mounds in various parts of North America, the skulls found are almost invariably very short and truncated at the occiput, and looking from behind exhibit the vertex rising almost to a triangular point.

Perhaps we might reduce to three general forms all varieties of skulls:—1. The oval; 2. The long and narrow; 3. The broad pyramidal. The oval appears to be the most perfect form: to this we should refer the skull of the Indo-European and Semitic races. Among these nations, we find the largest minds, the largest

brains, and the largest skulls. Perhaps there is another point which distinguishes the skulls of these families, that they are the least angular, all the surfaces being rounded and less subject to squareness and approach to angularity than less civilised races. I think, also, that if we examine the heads of the most intelligent, the most gifted in moral power, the most enlightened, the greatest thinkers of this division of mankind, we shall find their heads the most free from angularity or special protuberance in any one part, but the whole surface of the head or skull of a most beautiful round or oval form. This harmony of form where all parts of the brain would appear to be equally developed, where no one part predominates or rises from the surface, but all is an even round or oval, this harmony in size and just proportion would seem to be the real character of the most highly developed brain. I would instance the heads of Shakespear, of George Canning, of Sir Thomas Lawrence, and Rammohun Roy, as familiar instances of the oval: the head of Socrates appears also to have been a perfect round, so far as the anterior part of the head has been handed down to us.

In the obtaining knowledge from without, in the perceiving and registering it within, the gray matter of the brain is supposed to play an important part. We find within the eye-ball that the expansion of the optic nerve, the retina, consists entirely of the gray matter, in all respects similar to that which is expanded over the whole surface of the brain. The retina receives the sensations of light, colour, form, etc., and transmits them by the optic nerve to a part of the brain where the gray matter again appears; and as the gray matter in the eye-ball is concerned in forming the sensation of light, so the gray matter at the other end of the optic nerve in the brain is probably concerned in changing the sensation into the perception of light, etc. We know the important office of that small piece of gray matter forming the inner coat of the eye-ball, how it takes cognisance of colour, form, distance, and the numerous offices connected with the organ of sight. Now, the expansion of the retina does not exceed three square inches in extent, and is very thin, while the gray matter on the surface of the brain is many times thicker, and spread out would cover six hundred and seventy square inches, or ten feet by five and a half. Seeing the all important duties performed by the comparatively small pieces of gray matter which are subservient to the sensation of light and sound in the interior of the eye and the ear, we may imagine the multitudinous duties which must be performed by the outer surface of the brain, in the generation of that force which is in all probability concerned in converting the information collected by our external senses, into the innumerable perceptions and cognitions upon which our mind thinks, reasons,

and draws conclusions. If the gray or vesicular matter of the brain and ganglia be the seat or source of power, what can be the office of the enormous quantity of this same matter which forms the outer coating of the cerebral hemispheres? The gray matter of the spinal cord, of the ganglia, of special sensations, and of the cerebellum, gives the powers of seeing, hearing, feeling, smelling, tasting, in all their relations, and supplies muscular power to all parts of the body. The innumerable nerves of motion and common sensation distributed every where, are dependant on it for their influence in all the intricacies of sensation and motion. Now, the proportion of the gray matter in all the nervous centres below the true brain cannot exceed the proportion of one part to a hundred in the cerebral hemispheres. We may make it a problem for the rule of three. If the one portion of gray matter in the spinal cord, the sensory ganglia, the cerebellum, and we might add, in the ganglia of the sympathetic nerve, can effect all the phenomena of special sensation, muscular motion, common sensation, digestion, respiration, and all the secretions of the body, what will the hundred parts of similar gray matter in the cerebral hemispheres effect? The answer will be that this enormous reservoir of power must be influential in the development of the intellectual and moral faculties. It is here in all probability that the instinctive or intuitive principles are located: those intuitions from which originate our desires, our affections, sympathies, and social sensibilities, our moral sense, and our religious aspirations, our powers of comparing all the relations of phenomena, their causes and effects, our intuitive capabilities of contemplating time and space, infinity and eternity; in a word, all that aids us in the development of the inductions, conclusions, and judgments of our intellectual faculties, and their expression in signs and language.

When we reflect on the multiplicity of the phenomena, the relations and the laws of the various sciences which it is in the power of the human mind to acquire; when we think of the numerous problems of philosophy which extend as our knowledge extends; when we reflect on all the capabilities of imagination, ideality, and poetry, we may conceive business enough for all the gray matter of the cerebral hemispheres, in supplying the necessary power to collect and classify all the facts and phenomena of the outward world, which excite into action the latent yet transcendent faculties of human intelligence.

There can be little doubt that the cerebral hemispheres of the brain constitute the instrument through which the mind exerts its influence on the body. Any injury of sufficient severity inflicted upon them is at once accompanied by loss of intellectual power; any malformation or lesion by disease is attended by a deterioration of one or more of our internal sensibilities; any un-

usual development with correspondingly increased intellectual powers, not only as regards animals of different tribes, but of different men compared with each other. The general impression is founded on fact, that the men who have distinguished themselves for mental attainments or intellectual power have been also distinguished for the unusual development of their cerebral hemispheres. There is, however, one fact which appears to modify our conclusions as to absolute size of brain, and that is symmetry of the two sides. I think you will never see a well-modelled head, even of small size, without remarkable observing, knowing, and thinking powers. On the other hand you will never see a very unsymmetrical or deformed, or very small head, without inferiority of intellectual power, eccentricity, idiotcy, or insanity. Such heads exhibit disproportion of the two halves of the brain, and such disproportion appears to give rise to a want of harmony in the various sensibilities and intellectual faculties. Very symmetrical, globular heads, although small, have been accompanied with highly developed intellectual and moral powers.

To what extent the material structure of the nerves and brain are connected with the mind is one of the most interesting and important of problems. To solve it entirely, in the present state of our knowledge, is impossible; but we know enough of nerve influence, and we know enough of the mind within, to make an attempt in this direction; and I think the inquiry in itself will not only tend to elevate our thoughts beyond the present transitory stage of our existence, but also enable us to carry out with more satisfaction the purposes and objects of our daily life. Milton says—

> "In the soul
> Are many lesser faculties, which serve
> Reason as chief."

The subject before us has naturally led me to say a few words on phrenology. During the last twenty years the most devoted believers in this science have allowed it almost to remain in abeyance; perhaps its most enthusiastic advocates had pushed some of its principles to the very verge of absurdity, and assuredly the quackeries and fortune-telling of some of its practical followers disgusted many who were willing to admit that it had a basis of truth in it. Silently, however, the subject has been advancing; many of our physiologists now admit that the skull is to a large extent moulded on the brain, that the size and shape of the skull is a criterion of the size and shape of the brain. Almost every physiologist will admit that the brain is the organ of the mind, that the larger the brain the larger are the functions of the organ, and many will now go so far as to admit that in the posterior parts of the brain are seated the animal propensities, appetites,

and passions; in the upper part the moral and religious instincts and intuitions; and in the forepart the conceptions, the knowledge of things and persons, the powers of comparison, of causality, and of reason.

As a theory of the human mind, phrenology or the location in the brain of separate internal organs of sense, of distinct faculties for the many instincts and intuitions which all who think on the subject must appreciate as the first beginnings of mental power; a knowledge of the brain and its functions (which is phrenology) must be the firmest basis on which to found our knowledge of the mind itself. There are facts of mind as there are facts in relation to matter, and the mental powers give us knowledge of both. Who can doubt that the eye and the ear were arranged in unison with the laws of light and the laws of sound? who can doubt that we acquire our knowledge of the facts relative to light and to sound through the medium of the nervous matter of the optic and olfactory nerves, the nerves of the eye and the ear? These nerves carry into the brain the facts which internal senses convert into ideas. Now, the receiving points for sight and sound are composed of the same gray nervous matter which covers the whole surface of the brain; and we argue that if a small, very small portion of the gray matter at the bottom of the eye-ball can do all the wonders appertaining to the organ of sight, what must be the function of that enormous amount of the same gray matter which forms, as it were, the outer coat of the whole brain? The gray nervous matter of the eye and of the ear, after receiving their respective sensations, transmit them into the brain by the white nervous matter of their respective nerves. Below the gray matter of the surface of the brain we find white nervous matter in immediate contact; and we think it probable that the whole surface of the brain is a congeries of internal organs of sense for the reception of facts, and the generation of sensibilities: that the white nervous matter below conveys these facts to other parts of the brain, where they become conceptions and ideas. I think this seems more probable than that the external convolutions act directly in the formation of ideas, from the analogy we may trace in the retina at the bottom of the eye receiving the facts in relation to light and colour, transmitting the sensations by the white optic nerve into the brain, where perception and what may be called registration of the mental act, or ideality occurs.

Just as the organ of sight was constructed in accordance with the pre-existing laws of light and colour, so we maintain that there is an internal organ or sense which intuitively gives us knowledge of the fact that man must have had an all powerful Creator, unto whom he intuitively feels veneration and devotion. I select the fact of veneration as a fact of the mind admitted by

all. Every observer of man both in his savage and in his civilised states, must admit the brain to possess an organ of veneration, or a special intuitive faculty by which we feel the sentiments, admire the works, appreciate the goodness, and enjoy the happiness resulting from faith in those convictions of the infinite absolute power of the Creator and the immortality of the created soul of man. So powerful when fully developed is the intuitive faculty of veneration, that we have evidence, before Christianity could have given the impulse, of the native power of the faculty when fully developed, as it appears to have been in Plato and in Socrates, and no doubt in multitudes in ancient days, although not so fully cultivated and developed as in these remarkable German sages. So struck was Plato with the innate conceptions of the organ of veneration, that he speculated on some prior existence for the human soul, and that much of its knowledge was derived from recollections of a former state of existence. It appears to me a remarkable evidence of the composition of the mind from several distinct faculties, and therefore of the main truth of phrenology, that so powerful a mind as that of Plato was so impressed with the possession of an innate intuitive power of looking into the infinite and the absolute, that he could only explain it by supposing the mind in our present stage of existence to be in a progressive state from a former life. It was a large development of the faculty of veneration that led to such thoughts both in Plato and in Socrates: they both possessed large brains, and especially large in that portion of the brain where is located the intuitive power of veneration. In corroboration of the probability that phrenologists have rightly located this faculty in the brain, we may observe that the great Italian painters, long before phrenology was dreamt of, gave to the head of Christ a prominence in the upper part of the cranium.

In taking veneration as an example of an innate sense for a special purpose, if we can establish a bare possibility of its local position in the brain we at once settle the question of the utility of studying and recording measurements of the skull. If a part of the brain is devoted to moral and religious truths, in particular individuals where these truths are most easily felt and appreciated, it is not improbable that such part of the brain will be larger than usual; just as in the most civilised countries among the educated classes the whole anterior lobe of the brain gives incontestable evidence of the fact, that the larger the intellectual power the larger is the organ of the intellectual power, and the larger is that part of the skull which has heen moulded over the increased organ or organs in the brain. Therefore must the study of the sizes and shapes of the skull be influential in shewing the varying degrees of the intelligence, of the sentiments, of the affections, and of the animal propensities of the different races and families of men.

As an illustration of the highly probable truth of at least some of the conclusions of phrenologists, I have taken the intuition, faculty, internal sense, or organ of veneration; and I have no hesitation in saying, that if it be possible to get at facts of the mind, this is one. At the top of the head, or rather in the brain at its very summit, are located the convolutions and gray nervous matter, which give us knowledge of such laws as appertain to the great Intelligence, from whom all the laws of Nature have been derived. The very existence of such terms as infinite, absolute, eternal, is sufficient proof that man was intended to stretch his mental powers beyond the things of this world into another of a more spiritual nature. So that same word spirit conveys an idea, and no idea could ever have been received into the human mind unless it had been in accordance with the Divine laws: to whatever distance the human mind can extend its speculations, we may be certain was intended. As the eye or the ear could not have distinguished colour or sound but in accordance with the pre-existing laws of light and of harmony, so no faculty of the mind can exist but in accordance with those Divine laws which must have been in the Divine intelligence and government before the mind of man was formed.

The resemblance in form and structure of the human and simian brains must be admitted, and we may also concede the point, that that of man is not essentially different from that of the chimpanzee: there is also a striking resemblance in the convolutions. The real difference is in magnitude, and the infinitely larger amount of the gray matter in depth as well as breadth, which covers the more extensive superficies of the convolutions in man. But, however the apes may approach to man in physical similitudes, however similar may be his material nature, we may be contented with the range of intelligence in which man towers over the most intelligent of the brute creation. A considerable amount of intelligence must be admitted to exist in many animals; they have social qualities; they love their offspring, and one another; they have the faculty of locality by which they find their way home from almost incredible distances, and under very difficult circumstances, such as crossing a chain of mountains, a very large river, and even the sea. The dog must have the faculties of veneration, of gratitude, etc., in relation to his master. In a word, we may concede the point that many animals approach to man in sense and intellect. But when we reflect on the nature of language, by which man can express his sensations; his affection; his veneration; his appreciation of all the facts of the outer world, and the intuitions, the revelations of his soul within; when we consider the power of generalisation, of abstraction; his knowledge and admiration of all that is sublime and beautiful,

good, and true; his capability of clothing his thoughts in language so intelligible to his fellow men, that he can arouse in multitudes the same enthusiasm by which his own soul is penetrated:—when we reflect on the enormous power of such minds as those of Shakspeare, Milton, Bacon, in penetrating the mind of their fellow creatures with the grand and noble and exalted thoughts with which their own souls were filled,—we may rest satisfied that man belongs to a separate and distinct kingdom in nature, and that his position in creation is immeasureably above that to which his mere animal nature would have limited him. However he may resemble the family of the ape tribe in his material form, we may be perfectly satisfied that no gorilla or chimpanzee will ever compete with him in such ideas as the intuitions and aspirations of Addison have clothed with the language of poetry.

> "The soul, secur'd in her existence, smiles
> At the drawn dagger, and defies its point.
> The stars shall fade away, the sun himself
> Grow dim with age, and nature sink in years;
> But thou shalt flourish in immortal youth,
> Unhurt amidst the war of elements,
> The wreck of matter, and the crash of worlds."

VI.—*On Sir Charles Lyell's "Antiquity of Man", and on Professor Huxley's "Evidence as to Man's Place in Nature."*

By JOHN CRAWFURD, F.R.S.

Read April 14th, 1863.

I PROPOSE in this paper to offer to the Society some observations on the late able works of Sir Charles Lyell and Professor Huxley, strictly confining myself to the very few branches of their subjects on which I have bestowed especial attention.

I may begin at once by stating my conviction that the evidence which has of late years been adduced, giving to the presence of man on the earth an antiquity far beyond the usual estimate of it, is already satisfactorily established. There can, I think, now be no question that man was a contemporary of animals such as lions, hyenas, elephants, and rhinoceroses, extinct far beyond the reach of human record.

But among the evidences brought forward to prove the antiquity of man, the paucity of relics of his own person, compared with the abundance of those the unquestionable work of his hands, have attracted special notice. Thus, in the valley of the Somme and other places, where flint implements have been found in abundance in the same drift with the bones of the extinct ele-